

WHAT IS CLAIMED IS:

1. A cartridge seal assembly, comprising:

a housing having a channel space formed therein to define an inner surface;

5 a bearing device joined to said housing at the inner surface thereof and having at least one bearing surface; and

at least one seal joined to said housing, at least one of said at least one seal being disposed generally axially of at least part of said bearing device.

2. The cartridge seal assembly as recited in Claim 1, wherein said bearing device and/or at least one of said at least one seal being bonded to said housing.

3. The cartridge seal assembly as recited in Claim 1, wherein said bearing device being fixedly mounted to said housing.

4. The cartridge seal assembly as recited in Claim 1, wherein the joining relationship between said bearing device and said housing being defined by a substantially gap-free interface.

5. The cartridge seal assembly as recited in Claim 1, wherein the joining interface between said housing and said bearing device being substantially free of extrusion gaps.

6. The cartridge seal assembly as recited in Claim 1, wherein said at least one seal further includes:

a first generally annular seal disposed at one axial side of  
said bearing device, said first seal including at least one  
5 static sealing area and/or at least one dynamic sealing area.

7. The cartridge seal assembly as recited in Claim 6,  
wherein said at least one seal further includes:

a second generally annular seal disposed at another axial  
side of said bearing device, said second seal including a wiper  
5 element.

8. The cartridge seal assembly as recited in Claim 7,  
wherein one end of said housing proximal said first seal defining  
a high pressure end, and another end of said housing proximal  
said second seal defining a comparatively low pressure end.

9. The cartridge seal assembly as recited in Claim 6,  
wherein said first seal further includes:

a body portion;  
a first leg portion extending generally radially inward from  
5 said body portion;  
a second leg portion extending generally radially outward  
from said body portion; and  
a finger portion having a proximal end and a distal end, the  
finger portion extending generally radially outward at the  
10 proximal end thereof from said second leg portion along an end  
surface of said housing, the distal end defining a terminal lip

having a surface extending at least in part radially outward past an axial plane of the radially outermost surface of said housing.

10. The cartridge seal assembly as recited in Claim 6, wherein the at least one static sealing area of said first seal being disposed at least in part beyond a generally axially-facing surface of said housing and/or a radially outer surface of said 5 housing.

11. The cartridge seal assembly as recited in Claim 6, wherein the at least one static sealing area of said first seal further includes:

a first static sealing portion extending generally radially 5 along a generally axially-facing end surface of said housing; and

a second static sealing portion engaging the first static sealing portion and extending at least in part immediately past the axial plane of an outer radial surface of said housing.

12. The cartridge seal assembly as recited in Claim 11, wherein the second static sealing portion of said first seal being made of a compressible material and being sufficiently formed such that during operative field installation as the 5 second static sealing portion engages an opposing surface of a field device and thereby experiences compression, the compressed second static sealing portion forms a substantially fluid-tight seal circumferentially about said housing between the outer radial surface of said housing and said field device.

13. The cartridge seal assembly as recited in Claim 6,  
wherein the at least one dynamic sealing area of said first seal  
further includes:

a contoured surface extending at least in part radially  
5 inward at least to the plane of the bearing surface of said  
bearing device to define at least one sealing line.

14. The cartridge seal assembly as recited in Claim 1,  
wherein said at least one seal further includes:

a first seal substantially covering a first end face of said  
housing and having a terminal lip portion;  
5 said terminal lip portion extending at least immediately  
past an axial plane of a radially outer surface of said housing  
to an extent sufficient to at least touch an opposing surface of  
a field device during installation of said cartridge seal  
assembly therein.

15. The cartridge seal assembly as recited in Claim 1,  
wherein said at least one seal further includes:

a generally annular seal portion circumferentially disposed  
at least in part about said housing.

16. The cartridge seal assembly as recited in Claim 1,  
wherein said at least one seal further includes:

a first generally annular seal disposed at least in part  
within a first groove defined in said housing at one axial side  
5 of said bearing device; and

a second generally annular seal disposed at least in part within a second groove defined in said housing at another axial side of said bearing device.

17. The cartridge seal assembly as recited in Claim 16, wherein:

said first seal includes a static sealing area and/or a dynamic sealing area; and

5 said second seal defining a wiper configuration.

18. The cartridge seal assembly as recited in Claim 16, wherein said first groove and said second groove defining a first portion of said housing therebetween that joiningly receives said bearing device, each of said first seal and said second seal  
5 being bonded to the first housing portion.

19. The cartridge seal assembly as recited in Claim 1, wherein said bearing device and/or at least one seal being removably joined to said housing.

20. A cartridge seal assembly, comprising:

a housing having a channel space formed therein to define an inner surface;

a bearing device joined to said housing at the inner surface  
5 thereof and having at least one bearing surface; and

a first generally annular seal disposed generally axially of said bearing device and joined to said housing, said first seal having a static sealing area and/or a dynamic sealing area.

21. The cartridge seal assembly as recited in Claim 20,  
wherein at least one of said bearing device and said first seal  
being bonded to said housing.

22. The cartridge seal assembly as recited in Claim 20,  
wherein said bearing device being fixedly mounted to said  
housing.

23. The cartridge seal assembly as recited in Claim 20,  
wherein the joining relationship between said bearing device and  
said housing being defined by a substantially gap-free interface.

24. The cartridge seal assembly as recited in Claim 20,  
wherein the joining interface between said housing and said  
bearing device being substantially free of extrusion gaps.

25. The cartridge seal assembly as recited in Claim 20,  
further includes:

a second generally annular seal disposed generally axially  
of said bearing device and axially opposite said first seal, said  
5 second seal being joined to said housing, said second seal  
including a wiper element.

26. The cartridge seal assembly as recited in Claim 25,  
wherein said bearing device being disposed at a generally axially  
central location of said housing, each of said first seal and  
said second seal being disposed in respective grooves formed in  
5 said housing at opposite sides of the housing central location  
and bonded to the housing at the central location thereof.

27. The cartridge seal assembly as recited in Claim 20,  
wherein the static sealing area of said first seal further  
includes:

a generally annular seal circumferentially disposed at least  
5 in part about said housing.

28. The cartridge seal assembly as recited in Claim 20,  
wherein the static sealing area of said first seal further  
includes:

a first static sealing portion extending generally radially  
5 along a generally axially-facing end surface of said housing; and  
a second static sealing portion engaging the first static  
sealing portion and extending at least in part immediately past  
the axial plane of an outer radial surface of said housing.

29. A cartridge seal assembly, comprising:

a housing having a channel space formed therein to define an  
inner surface, said housing further including a first generally  
annular groove and a second generally annular groove defined at  
5 respective sides of said housing;

a bearing device joined to said housing at the inner surface  
thereof and having at least one bearing surface;

a first generally annular seal disposed at least in part  
within the first groove of said housing and joined thereto; and  
10 a second generally annular seal disposed at least in part  
within the second groove of said housing and joined thereto.

30. The cartridge seal assembly as recited in Claim 29, wherein at least one of said bearing device, said first seal, and said second seal being bonded to said housing.

31. The cartridge seal assembly as recited in Claim 29, wherein at least one of said bearing device, said first seal, and said second seal being removably joined to said housing.

32. The cartridge seal assembly as recited in Claim 29, wherein:

said first seal includes a static sealing area and/or a dynamic sealing area; and

5       said second seal including a wiper configuration.

33. The cartridge seal assembly as recited in Claim 32, wherein the static sealing area of said first seal further includes:

a first static sealing portion extending generally radially along a generally axially-facing end surface of said housing; and

a second static sealing portion engaging the first static sealing portion and extending at least in part immediately past the axial plane of an outer radial surface of said housing.

34. The cartridge seal assembly as recited in Claim 29, further includes:

a generally annular seal portion circumferentially disposed at least in part about said housing.

35. A cartridge seal assembly, comprising:

a housing having a receptacle channel formed therethrough;  
a first means joined to said housing, said first means to  
define a bearing surface within the receptacle channel; and  
5 a seal system having at least one seal, said seal system  
being joined to said housing.

36. The cartridge seal assembly as recited in Claim 35,  
wherein said first means further includes:

a portion of said housing.

37. The cartridge seal assembly as recited in Claim 35,  
wherein said first means further includes:

a bearing device joined to said housing at an inner surface  
defined by said receptacle channel.

38. The cartridge seal assembly as recited in Claim 37,  
wherein said bearing device and/or at least one seal of said seal  
system being bonded to said housing.

39. The cartridge seal assembly as recited in Claim 37,  
wherein the joining relationship between said bearing device and  
said housing being defined by a substantially gap-free interface  
inhibiting extrusion.

40. The cartridge seal assembly as recited in Claim 35,  
wherein said seal system further includes:

a first generally annular seal bonded to said housing, said  
first seal including a static sealing area and/or a dynamic  
5 sealing area; and

a second generally annular seal bonded to said housing, said second seal including a wiper configuration.

41. The cartridge seal assembly as recited in Claim 40, wherein said first means includes a bearing device bonded to said housing at an inner surface defined by said receptacle channel.

42. An apparatus, comprising:

a housing having a receptacle channel formed therethrough to define an inner housing surface;

a bearing device bonded to said housing at the inner housing  
5 surface; and

at least one seal joined to said housing.

43. The apparatus as recited in Claim 42, wherein at least one of said at least one seal being bonded to said housing.

44. The apparatus as recited in Claim 42, wherein the at least one seal further includes:

a first generally annular seal having a static sealing area and/or a dynamic sealing area; and

5 a second generally annular seal having a wiper element.

45. The apparatus as recited in Claim 42, wherein the at least one seal further includes:

a seal circumferentially disposed at least in part about said housing.

46. A method of producing a cartridge seal assembly, comprising the steps of:

providing a housing having a channel space formed therethrough to define an inner surface;

5        bonding a bearing structure to the inner surface; and joining at least one seal to said housing.

47. The method as recited in Claim 46, wherein the joining step further includes the step of:

      bonding the at least one seal to said housing.

48. A method of producing a cartridge seal assembly, comprising the steps of:

      providing a housing having a channel space formed therethrough to define an inner surface;

5        joining a bearing structure to the inner surface to define a joining interface therebetween being substantially gap-free; and joining at least one seal to said housing.

49. The method as recited in Claim 48, wherein the step of joining the bearing structure to the housing inner surface further includes the step of:

      bonding the bearing structure to said housing.